

2006 Hurricane Briefing



Overview

- ❖ US Hurricane History - The costliest, deadliest, the most intense
- ❖ **Atlantic Hurricane Season / Atlantic Basin Formation Areas**
- ❖ **US Mainland/Army Posts Strikes Since 1900**
- ❖ **Caribbean Hurricanes Since 1900**
- ❖ **Saffir-Simpson Hurricane Scale**
- ❖ **2005 Atlantic Hurricane Summary**
- ❖ **Drs. Klotzbach and Gray's 2006 Atlantic Basin Forecast**
- ❖ **2006 Atlantic Tropical Storm Names**

US Hurricane History

The Costliest



- ❖ **The third most expensive hurricane to hit the US was Charley, which caused \$15.4 billion worth of damage in 2004. It was followed a few weeks later by Hurricane Ivan moving into the number four position with \$14.9 billion**

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- ❖ **In 2005, Hurricane Katrina became the most expensive natural disaster in US History. Total damages cost at least \$80 billion**
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- ❖ In 1998, Hurricane Mitch killed between 11,000 and 18,000 people in Central America, mostly by flooding and mudslides
- ❖ The deadliest hurricane to hit the US was in Galveston, Texas in 1900
 - ❖ Claimed at least 8000 lives
 - ❖ Actual deaths may have been as high as 10,000 to 12,000

US Hurricane History

The Most Intense

- ❖ Intensity of a storm is based on its lowest central pressure



- ❖ Hurricane Wilma, in 2005, had the lowest central pressure ever measured in an Atlantic Basin storm. It reached 882 mb while in the western Caribbean, but weakened before making landfall on the Gulf coast of southern Florida

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- ❖ Three of the most intense hurricanes ever measured occurred in 2005:

- (1) Wilma - 882 mb
- (4) Rita - 897 mb
- (6) Katrina - 902 mb





US Hurricane History

The Strongest at US Landfall

- ❖ **In 1935, the Florida keys were struck by the Category 5 “Labor Day” hurricane. Sustained winds were estimated to be between 185 and 200 mph**



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- ❖ In 1969, when Hurricane Camille struck the Gulf coast near the mouth of the Mississippi river, it was near its maximum strength, with sustained winds near 190 mph
- ❖ Caused over \$5 billion in damages and claimed 256 lives



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❖ Hurricane Charley in 2004 matched Andrew's strength at landfall, with 145 mph sustained winds as it hit the central Florida Gulf coast near Punta Gorda



Saffir-Simpson Hurricane Intensity Scale

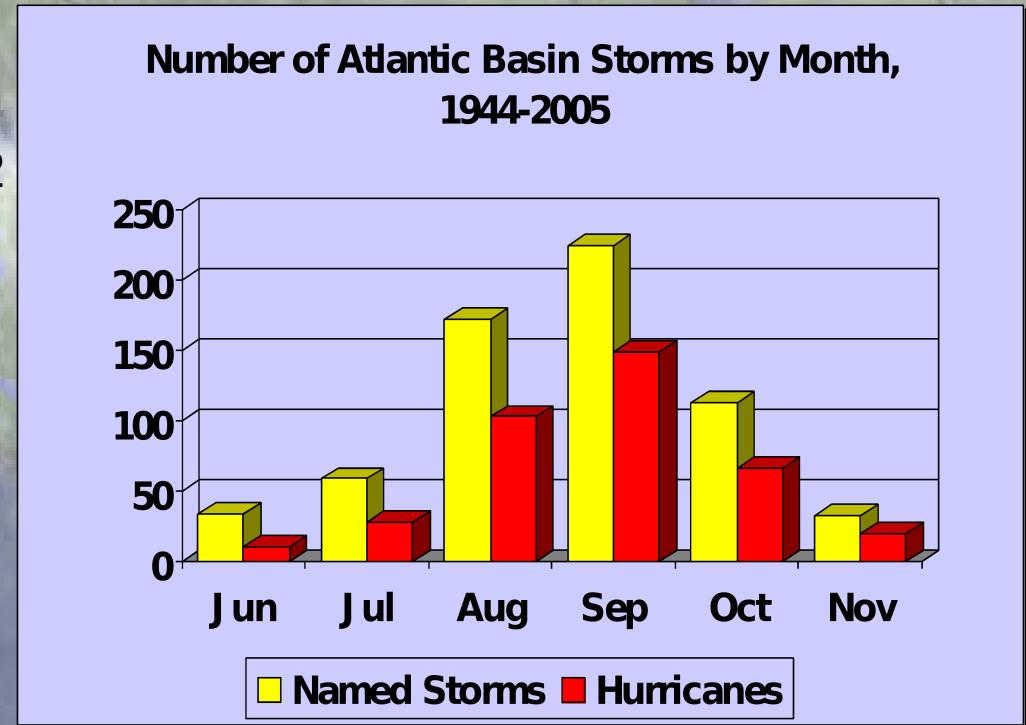
- ❖ Category rating (1-5) is based on sustained wind speed
- ❖ Represents hurricane's current strength
- ❖ Categories 3-5 are considered major hurricanes
- ❖ Provides estimate of potential property damage & flooding
- ❖ expected in landfall area
- ❖ Storm surge estimates depend upon slope of continental shelf

| Category | 1 | 2 | 3 | 4 | 5 | |
|--------------------------|------------|-------|--------|---------|---------|--------------|
| Wind speed (mph) | 73 or less | 74-95 | 96-110 | 111-130 | 131-155 | 156 or more |
| Storm Surge (feet) | 0-3 | 4-5 | 6-8 | 9-12 | 13-18 | 19 or higher |

Atlantic Hurricane Season

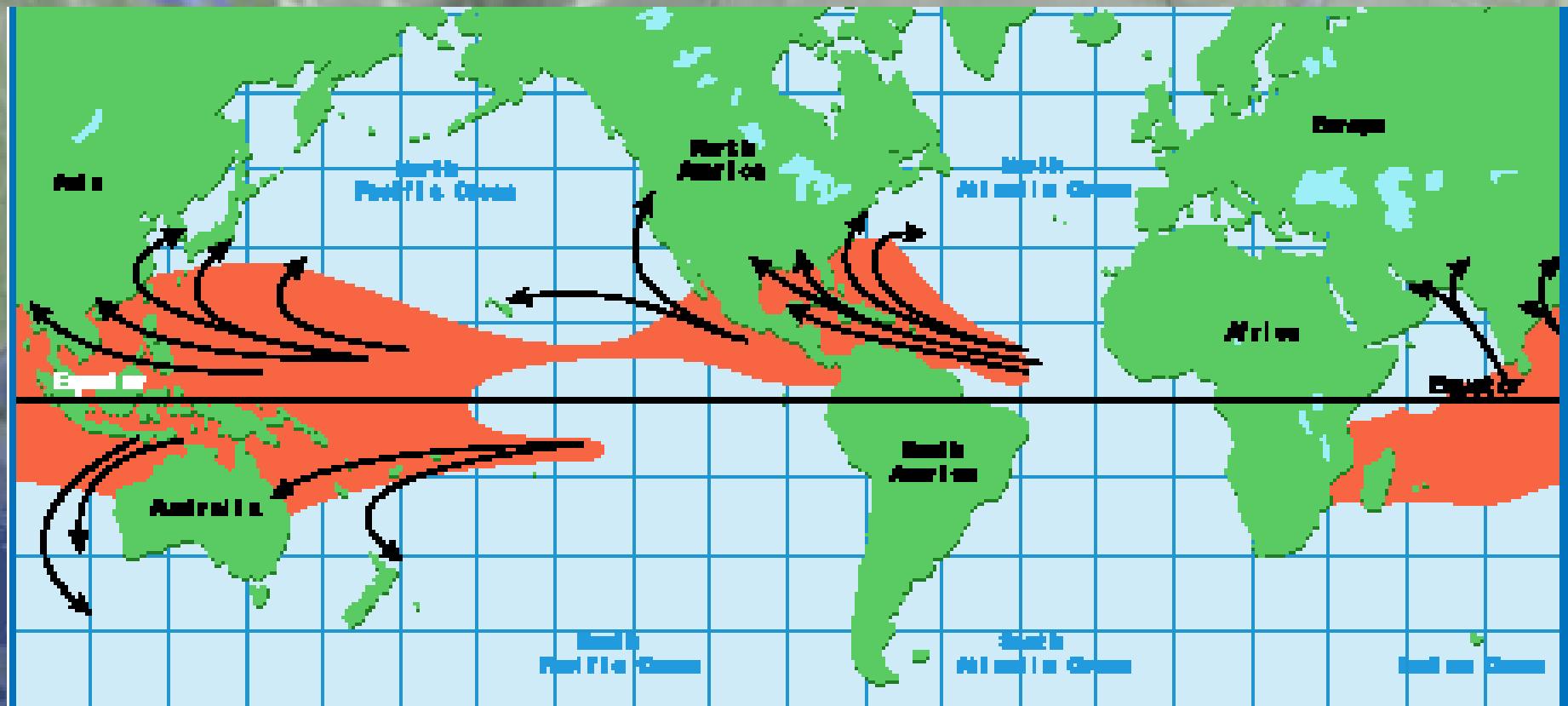
Season officially begins June 1st and ends November 30th

- ❖ Majority of storms occur during August and September
- ❖ Most named storms last from 2 to 10 days
- ❖ In 2003, Tropical Storm Ana formed in April, and two tropical storms formed in December
- ❖ Tropical Storm Zeta in 2005 was the second named storm ever to form in December and last into January



- ❖ **A Tropical Storm becomes a Hurricane when winds reach 74 mph or greater**

Where Hurricanes Form



Hurricanes are products of a tropical ocean and a warm, moist atmosphere. They are typically steered by high-level easterly winds while south of 25° north latitude, and by high-level westerly winds north of 25° north latitude.

Source: National Weather Service hurricane preparedness guide

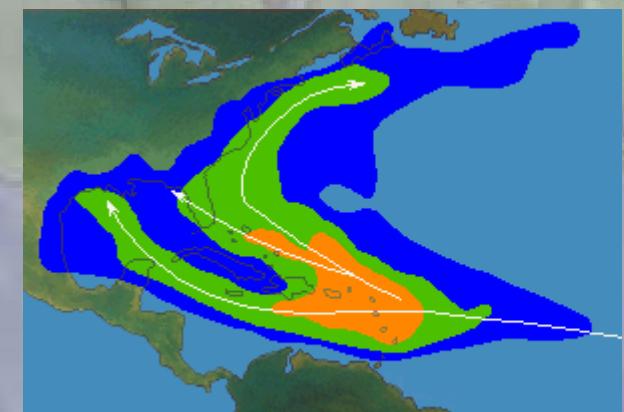
Storm Location by Month



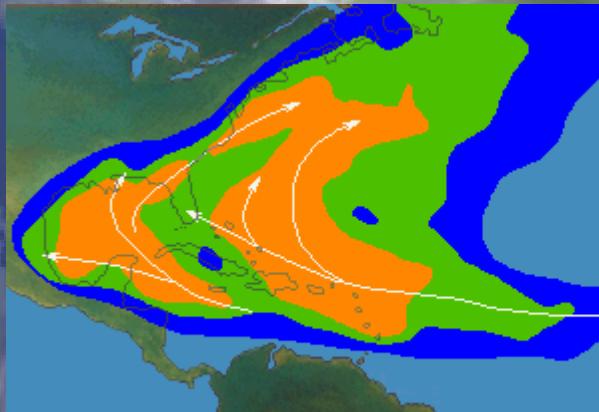
June Average
<1 Storm per Season



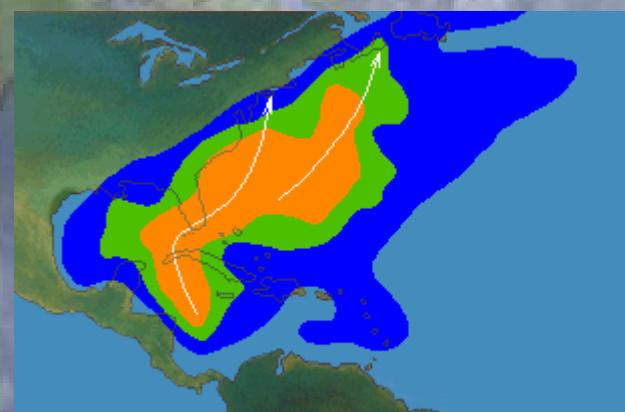
July Average
1 Storm per Season



August Average
2.8 Storms per Season



September - Average
3.6 Storms per Season



October- Average
1.8 Storms per Season



November - Average
<1 Storm per Season



CONTINENTAL UNITED STATES HURRICANE STRIKES 1950 - 2005



Danny (1955)
Edith (1971)
Audrey (1957)
Rita (2005)
Bonnie (1996)
Cindy (1963)
Chantal (1989)
Debra (1989)
Jerry (1989)
Alicia (1983)
Fern (1971)
Carla (1961)
Celia (1970)
Bret (1999)
Allen (1980)
Beulah (1967)

Danny (1997)
Frederic (1979)
Georges (1998)
Ethel (1960)
Elena (1985)
Katrina (2005)
Kate (1985)
Camille (1969)
Flossy (1956)
Dennis (2005)
Elaine (1975)
Flossy (1956)
Florence (1953)
Agnes (1972)
Earl (1998)
Alma (1966)
Cindy (1959)
Hugo (1989)
Gracie (1959)
Able (1952)
Bob (1985)
David (1979)
Alma (1966)
Dora (1964)

Baker (1950)
Ivan (2004)
Erin (1995)
Opal (1995)
Dennis (2005)
Elaine (1975)
Flossy (1956)
Florence (1953)
Agnes (1972)
Earl (1998)
Alma (1966)
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David (1979)
Alma (1966)
Dora (1964)

David (1979)
Erin (1995)
Jeanne (2004)
Frances (2004)
Cleo (1964)
Katrina (2005)
Kings (1950)
Andrew (1992)
Betsy (1965)
Inez (1966)
Donna (1960)
Floyd (1987)

Carol (1954)
Donna (1960)
Gloria (1985)
Edna (1954)
Bob (1991)
Belle (1976)

Isabel (2003)
Connie (1955)
Ione (1955)
Ginger (1971)
Bertha (1996)
Fran (1996)
Diana (1984)
Charley (2004)
Gaston (2004)
Hazel (1954)
Cindy (1959)
Hugo (1989)
Gracie (1959)
Able (1952)
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SAFFIR-SIMPSON HURRICANE CATEGORIES (at Strike or Landfall)

Sustained Winds (MPH)

- 74-95 Category 1
- 96-110 Category 2
- 111-130 Category 3
- 131-155 Category 4
- >155 Category 5

There were no hurricanes strikes in the U.S. for the period 2000-2001.

Due to a density of storms in some locations, actual strike locations are approximate.

* STRIKES - includes hurricanes that did not make direct contact, but did produce hurricane force winds over land.

NOAA'S NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA

Protecting the past... Revealing the future

US Mainland Army Posts

Strikes since 1851

A “Strike” is counted as at least tropical-storm-force winds within 65 miles of the post

| Number of: | Tropic al storms | Hurricanes | | | Storms per 100 years |
|-----------------------------|------------------------|---------------|---------------|--------------------|----------------------------|
| | | Category 1 | Category 2 | Category 3 or 4 | |
| Fort Stewart | 56 | 10 | 3 | 5 | 48 |
| Camp Blanding | 42 | 16 | 2 | 2 | 40 |
| Fort Bragg | 41 | 5 | 3 | 3 | 34 |
| Fort Eustis | 39 | 4 | 1 | 0 | 28.5 |
| Fort Benning | 30 | 4 | 1 | 0 | 23 |
| Fort Dix | 23 | 3 | 1 | 0 | 17.5 |
| Fort Polk | 13 | 4 | 4 | 1 | 14 |
| Fort McPherson | 16 | 1 | 0 | 0 | 11 |
| Fort Hood | 11 | 1 | 1 | 0 | 8 |
| Fort Sam Houston | 10 | 3 | 0 | 1 | 9 |
| Fort Campbell | 5 | 0 | 0 | 0 | 3 |



Caribbean Hurricanes

1900-2004

Number of Hurricanes
Within 60 Miles of Land Mass

> 30 (Red)

21-30 (Orange)

10-20 (Yellow)

< 10 (Green)



The 2005 Atlantic Hurricane Season

| | 2005 | Average Season |
|---|------------------------|-----------------------|
| Named Storms | 27 (record) | 10 |
| Hurricanes | 15 (record) | 6 |
| Major Hurricanes (Category 3, 4, or 5) Other records set in 2005: Category 5 Hurricanes | 7 | 2 |
| | 4 (record) | Less than 1 |

- ❖ Most tropical storms in one season before August 1st (seven)
- ❖ Costliest US hurricane (Katrina, 75-80 billion dollars)
- ❖ Most intense hurricane ever measured (Wilma, 882 mb central pressure)
- ❖ Latest ending hurricane season (Tropical Storm Zeta dissipated Jan 6, 2006)

The 2005 Atlantic Hurricane Season

The Big Storms of 2005

- ❖ Hurricane **Dennis** became the strongest July storm on record when its central pressure dropped to 930mb while it was a category four hurricane. It struck Cuba before making landfall on the Florida Panhandle. Dennis killed 88 people and caused \$4.6 billion in damages

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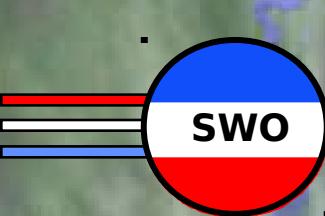
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- ❖ Hurricane **Rita** entered the Gulf of Mexico as a category 2 storm, and then set records for both the most rapid one-hour intensification of any Atlantic Basin storm, and also for the lowest recorded pressure in the Gulf of Mexico. Storm surge from Rita destroyed coastal communities along the Louisiana and southeast Texas coasts, causing \$10 billion in damages and 7 deaths.

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- ❖ The strongest tropical cyclone on record in the Atlantic basin was Hurricane Wilma, with 185 mph winds and a central pressure of 882mb. Wilma became the record-setting fourth category five storm to form in one season. It struck Quintana Roo in Mexico as a category four, and south Florida as a category three, causing \$16-20 billion in damages and 22 deaths.

swo

Recent Major Hurricanes

Category 3

Sustained winds 111-130 mph, Storm surge generally 9-12 ft above normal

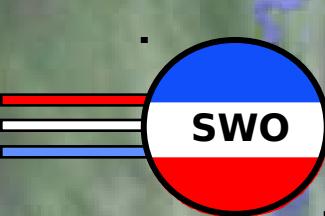
- 2004: Jeanne (120 mph)**
- 1998: Bonnie (115 mph)**
- 1996: Fran (115 mph)**

Recent Major Hurricanes

Category 4

Sustained winds 131-155 mph, Storm surge generally 13-18 ft above normal

- 2005: Dennis (150 mph)
- 2004: Charley (150 mph), Frances (145 mph), Karl (145 mph)
- 2002: Lili (145 mph)
- 1999: Bret (145 mph), Floyd (155 mph)
- 1995: Opal (145 mph)

swo

Recent Major Hurricanes

Category 5

Sustained winds greater than 155 mph, Storm surge generally greater than 18 ft above normal

2005: Emily (160 mph), Katrina (175 mph), Rita (180 mph), Wilma (185 mph)

2004: Ivan (165 mph)

2003: Isabel (165 mph)

1998: Mitch (180 mph)

1992: Andrew (175 mph)

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Sustained winds 111-130 mph, Storm surge generally 9-12 ft above normal

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2006 Atlantic Basin Forecast

by Drs. Klotzbach and Gray

“We foresee another very active Atlantic basin tropical cyclone season in 2006. However, we do not expect to see as many landfalling major hurricanes in the United States as we have experienced in 2004 and 2005.”



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**2006
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❖ Named Storms



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- ❖ **Named Storms**
- ❖ **Hurricanes**

5.9



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| 2006 Average Forecast Season | | |
|--|---|-----|
| ❖ Named Storms | 9 | |
| ❖ Hurricanes | | 5.9 |
| ❖ Intense Hurricanes (Category 3, 4, or 5) | 5 | 2.3 |

2006 Atlantic Basin Forecast

by Drs. Klotzbach and Gray

**Forecast probability of a major hurricane
(winds faster than 111 mph) hitting the
U.S. Coast in 2006.**

| Location | 2006 Forecast | Century average |
|--|---------------|-----------------|
| Entire US Coastline | 81% | 52% |
| East Coast and Florida peninsula | 64% | 31% |
| Gulf Coast excluding Florida peninsula | 47% | 30% |

Source: Colorado State University

2006 Atlantic Basin Tropical Cyclone Names

Alberto
Beryl
Chris
Debby
Ernesto
Florence
Gordon

Helene
Isaac
Joyce
Kirk
Leslie
Michael
Nadine

Oscar
Patty
Rafael
Sandy
Tony
Valerie
William

Hurricane Briefing Sources

- ❖ **THE DEADLIEST, COSTLIEST, AND MOST INTENSE UNITED STATES TROPICAL CYCLONES FROM 1851 TO 2004 (AND OTHER FREQUENTLY REQUESTED HURRICANE FACTS)**, Updated August 2005 by Eric S. Blake, Jerry D. Jarrell (retired), and Edward N. Rappaport NOAA/NWS/Tropical Prediction Center/National Hurricane Center Miami, Florida Christopher W. Landsea NOAA/AOML/Hurricane Research Division Miami, Florida.
- ❖ **The National Hurricane Center website**
- ❖ **NOAA REVIEWS RECORD-SETTING 2005 ATLANTIC HURRICANE SEASON**, National Oceanographic and Atmospheric Administration
- ❖ **EXTENDED RANGE FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY AND U.S. LANDFALL STRIKE PROBABILITY FOR 2006**, Philip J. Klotzbach and William M. Gray with special assistance from William Thorson, Department of Atmospheric Science, Colorado State University

Hurricane Links

National Hurricane Center's Tropical Prediction Center
Go to 2d Weather Flight's Homepage